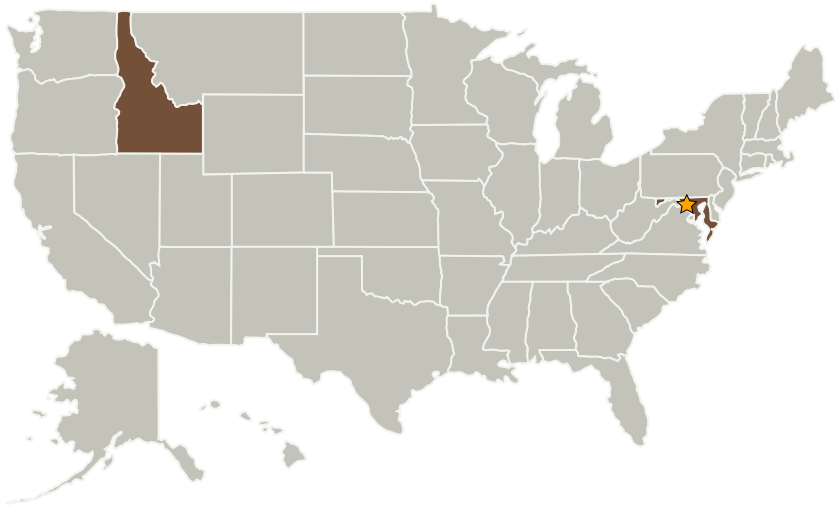
Flight Lossless Data Compression Electronics, Phase II

Completed Technology Project (2009 - 2011)

Project Introduction

Abstract There is a valid scientific data paradigm where no loss of data can be tolerated. However, transmission of raw data requires unacceptable bandwidth and storage resources such that the net data received is uncomfortably low. Lossless data compression can be used to preserve all data with no information loss and also help meet bandwidth and storage constraints. The current Universal Source Encoder of Space (USES) has been meeting many lossless compression needs for a decade. However, USES is not able to successfully address higher speed instruments, beyond 20 MSamples/sec, or function at quantization levels higher than 15 bits. The proposed work provides a new solution and presents a lossless data solution that should be valid for at least a decade or more. A radiation tolerant high performance (100M Samples/second) 32-bit lossless custom processor will be delivered in the proposed work which meets the CCSDS 121-0-B 1 recommendation. The processor will be implemented in a radiation tolerant 0.25 micron CMOS process which realizes a proven algorithm developed at GSFC and implemented in a 15-bit version 10 years ago. The new compressor is 5 times faster and has twice the input quantization range, suitable for modern spacecraft requirements. The net-list (design) of the processor can be used to synthesize a future 200 Msamples/sec plus data rates when a sub-100 nm radiation tolerant fabrication process is available.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
ICs	Supporting Organization	Industry	McCall, Idaho

Primary U.S. Work Locations	
Idaho	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.4 High Performance Memories